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Professional paper

# **TEACHER OF MATHEMATICS IN THE EYES OF STUDENTS OF THE TECHNICAL SCHOOL “IVAN SARIĆ” SUBOTICA**

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## ABSTRACT

*Out of 154 students who attended the Technical School “Ivan Sarić” in Subotica, the students’ opinion on the personal and work characteristics of their mathematics teachers was determined. Students were asked four open-ended questions to which they gave honest answers. The research showed that students expect teachers to be more involved in monitoring their developmental and personal problems, which are particularly significant in the adolescent period; they value more those teachers who enable them to be more active, have more direct contact with sources of knowledge, offer more conversation, discussion and exchange of ideas, more personal freedom to ask questions and more rights to participate in classes and express their ideas, imagination and creativity.*

**Key words:** education, mathematics teacher, student, teacher, teacher personality, education.

## INTRODUCTION

Every teacher should create objective conditions in the classroom under which all students would gladly and carefully study. However, practice shows that students do not work equally well with all teachers. What is the cause of these phenomena? It lies in the fact that the teacher fails to incite the student's persistent attention and motivation to work. Encouraging students to actively learn is one of the most important pedagogical functions of a teacher. For a start, the teacher should have good intentions for the student to be really in focus, to recognize the moment in which he/she has the effect to offer help, to always choose the appropriate tone, words, approach, to try to be the best possible example (Vasilev, 2007). Every student who is in a healthy environment loves to create, imagine and build. However, at some point, someone tells them that they are not good enough or that they have to get serious, and then the creative zeal in them disappears. Teachers must always awaken the creativity and originality of the students, help them get in touch with their inner feelings and thus with their intuition (Vasilev, 2007). The inner voice is the only rudder and if the students are able to feel it, magic happens.

Motives for learning appear in the teaching process starting from the first school hour. The basic condition for their appearance is, above all, the content of the work and harmonization with the student's potentials and interests. The work of a teacher must be interesting and attractive for students, it must be characterized not only by external liveliness and interest, but it must also be so by the internal activity it provokes (Gordon, 2008). The teacher must create a cheerful and working atmosphere in which everything will be simple, interesting and attractive for the student (Gordon, 2008). Many teachers think that their view is the only true one and firmly defend and protect it. They think they know everything and are always right. In this way, they prevent growth, exchange of ideas and acceptance of diversity. The development of quality potentials requires desire and commitment, as well as a state of tolerance, understanding and openness through which we develop and grow most easily. The teacher must give and receive love, empathy, understanding, respect, joy, sincerity (Gordon, 2008). What we give comes back to us. The teacher must be a symbol of change, a master of flying, who will teach students that in every relationship and story of life they can be more virtuosi and progress in self-realization (Gordon, 2008). The above is confirmed by the answers of the students who participated in the research conducted in April of this school year.

The subject of the research in this paper is the study of students' reactions to certain personal and work characteristics of their mathematics teachers, i.e.

obtaining a certain image of a “math teacher in the eyes of students”. The goal of this research is to prepare a scientific argumentation for taking further measures to improve the personnel situation at the Technical School “Ivan Sarić” in Subotica. Learning any school subject can become an enjoyable experience if approached correctly. It is the same with mathematics. Effective mathematics learning means acquiring certain skills such as listening skills, problem formulation, understanding the language of mathematics, learning through homework, interpreting formulas, evaluating, preparing for mathematical tests (Sharma, 2001). Mastering mathematics requires getting used to permanent, disciplined and thorough work, which is achieved with the support of a quality mathematics teacher. A good math teacher can, with very little effort, determine where a student is strong and weak, identify the cause and source of math anxiety, learn the way of communication that suits the student and his/her mathematical personality bets, choose such an approach in which the student will feel the best, convince students that mathematics is not only a school subject, but a necessary activity in life (Sharma, 2001).

## **ABOUT EDUCATION AND UPBRINGING**

Students are by nature neither good nor bad. They are born only with reflexes and with a little instinct. What kind of a student a person will be depends mainly on the wisdom, upbringing and education of parents, educators and teachers, because children’s nature is incredibly flexible in the beginning (Ber, Ber, 2012). In large numbers, students present raw materials for quality materials. It is not difficult to make a healthy student happy, and most students will be healthy if their minds and souls are properly nurtured. Love, understanding, empathy, quality education and upbringing are necessary to create the best type of human being (Grinspen, 2013). It was a common belief that students could be forced to learn only by intimidation, imperatives, verbalisms and punishment (Bergman, 2011). It was a complete lack of expertise in pedagogy. The basic idea is simple: true upbringing and education do not consist in external pressure, but in the habits of the spirit that spontaneously strive for desired rather than unwanted activities (Montessori, 2016).

Education is a systematically organized and simultaneous process of acquiring knowledge, skills and habits, developing cognitive abilities, training for the rational application of what has been learned, and encouraging permanent development and progress (Gottman, DeClaire, 2022; Juul, 2019). Upbringing is a systematically organized process of developing positive personality traits, harmonizing individual and social relationships, forming positive attitudes, building advanced views of the world and adopting the necessary moral, social and work values (Gottman,

DeClaire, 2022; Juul, 2019). The essential characteristics of education are: positive value determination, intention and social orientation. Only an educated student can provide optimal conditions for life and work. Education and training provide the modern student with stability in the dynamic changes of life, work, social relations and individual expression (Gottman, DeClaire, 2022; Juul, 2019).

Love and knowledge are the two most important prerequisites for proper upbringing and education (Russell, 2015). Love cannot exist as an obligation: ordering a student to love a teacher is completely useless. A teacher who wants to be loved must behave in such a way as to provoke love, as well as try to awaken in students such spiritual and physical characteristics that create growing affection and respect (Gordon, 2008). Reasonable teachers create reasonable students. Students need to feel the affection of their teachers - not duty and responsibility, for which no student is grateful. The teacher must sincerely enjoy the student's presence and progress. Some teachers have a habit of portraying themselves as the gods of Olympus, infallible and superhuman. Students do not like deception and hypocrisy. The teacher should not turn into some kind of hedgehog and stick out his/her thorns to keep the students at a distance. The main part of upbringing and education must be quality cooperation that must be based on love, respect and understanding (Gordon, 2008). A teacher should at all times show a serious interest in the welfare of students. Students must not be left to their own devices. Students are like tender plants. The teacher should protect them and nurture them properly, until they grow into big and strong trees. A teacher should continuously and unselfishly spread the light of his/her wisdom and impart superior knowledge to students. He/She should inspire students and help them see the glow of their own inner sun (Sri Chinmoy, 1992). *It is the sun that illuminates the darkness of the millennium and transforms the possibility of the experience of truth into the inevitability of the realization of truth* (Sri Chinmoy, 1992, 38).

The true authority of teachers germinates and grows on the fertile soil of mutual trust. The trust ensures the educational leadership of the teacher and the full loyalty, attachment and gratitude of the students (Juul, 2021; Matić, 1960). Distrust between teachers and students creates a gap, alienates and prevents educational influences. The lack of faith and trust in teachers has led many students astray in life and formed bad character traits in them: insincerity, ingratitude and rudeness. Students often need moral support, understanding and help from others. A student's trust in parents, teachers and educators is their daily need. If it does not come true, students will trust people less and experience the beauty and joy of life less (Juul, 2021; Matić, 1960). On all occasions when teachers judge students' mistakes, when they measure and apply punishments, when they evaluate successes and failures

in teaching, they must act fairly and respect the student's personality. In this way, the positive qualities and character traits of students are awakened: honesty, loyalty and gratitude (Juil, 2021; Matic, 1960).

Mathematical education is the acquisition of mathematical culture, i.e. mathematically cultivated thoughts (Dejić, Egerić, 2010; Freudenthal, 1973). Mathematical culture is the ability to apply mathematical methods to new problems, the ability to mathematize new life, professional and scientific situations, the ability to enjoy what is beautiful in mathematics (Dejić, Egerić, 2010; Freudenthal, 1973). Mathematical education is an individual intellectual activity (Dejić, Egerić, 2010; Freudenthal, 1973). This activity is encouraged, directed and channeled by the mathematics teacher. The basic role of the mathematics teacher is to direct the mentioned individual activity so that it becomes maximally efficient and successful. The main task of the mathematics teacher is the mathematical cultivation of each student, i.e. mathematizing the intelligence of each student to a certain situation (Skemp, 1962–1969). It develops the ability to reason correctly, prove, generalize, deduce, the ability to present the results of one's reasoning, but also the ability to understand and accept other student's reasoning (Skemp, 1962–1969). A mathematics teacher should help students to master mathematical language safely, which is one of the basic pillars of productive thought. Precise analysis, solid synthesis, the ability to mathematize situations, as well as a penetrating mathematical intuition form the foundation of productivity are all characteristics of mathematizing (Skemp, 1962–1969). Mathematics is constantly changing, constantly evolving. The mathematics teacher should monitor these changes and selflessly share them with the students.

A teacher who participates in the process of mathematics education should have the high qualities of a pedagogue: a sense of cooperation with students and other teachers, a critical-analytical attitude towards the results of his/her work, the ability to constantly encourage students to work independently and creatively, to skillfully choose teaching aids and sources of information and make them available to students (Gordon, 2008; Sharma, 2001). Pedagogical authority presupposes understanding of the student's nature, full trust between teacher and student, friendship, consistent pedagogical approach, objective and fair assessment of students' abilities and success (Gordon, 2008; Sharma, 2001). Quality mathematics education implies the teacher's solid professional training, conscientiousness and meticulousness in work, reputation in society, continuous work on oneself, continuous improvement, monitoring of modern trends in mathematics and their application in teaching (Gordon, 2008; Sharma, 2001). Only towards such an authority can the students have full and boundless trust and respect.

## TEACHER'S PERSONALITY

The system of pedagogical ideas, principles and professional knowledge is an abstract impersonal set of concepts, instructions and laws, which do not act automatically in education, but only when they are thought out and revived by a human being, the creative personality of a teacher. We know that not only professional knowledge and pedagogical education were given by teachers who marked our young days, who remained unforgettable for us and whom we remember with gratitude and respect. We remember their approach to man, their spoken or unspoken participation in our understanding of things, in our moral upliftment.

In his work *The Great Didactics*, Jan Amos Comenius expressed the demand that the school should be a workshop of humanity (Comenius, 1954). It seems that only those teachers are able to fulfill this task in which they feel that they have experienced with their being and freely adopted the knowledge that they present to the listeners. No matter how much knowledge a teacher possesses, it must not be a reason for arrogance and increased personal inaccessibility, but an optimistic message that must be communicated to others for the greater truth and glory of life. Only such teachers can awaken in the listeners a desire for knowledge and skills, only such are true educators (Faber, Mazlish, 2011). Undoubtedly, it is possible and necessary to prepare for the teaching profession. The message of Comenius stating that people are not born to work, but to build, also applies to teachers. There is a sure relationship between pedagogical and artistic creation. In the old century, the rule was that a man is born as a poet and becomes a speaker. Both would be valid for the personality of a teacher - as a teacher is born and becomes (Comenius, 1954).

The basic task of the teacher is to awaken and develop the creative abilities of students. Moreover, the teacher should enable students to apply these abilities and acquired knowledge in contact with the world. This means, above all, finding personal inclinations, abilities and talents in students. It is a requirement for an individual approach to the student. Appropriate professional material can be adopted by students if it is presented in an appropriate way, if it corresponds to the age and comprehension abilities of students, if it is professionally and methodically processed to reach directly the student's ear (Faber, Mazlish, 2011). Pedagogical mastery is a creative synthesis at the highest level. Pedagogical activity must contain a humane attitude towards the world, life, towards man, and that can only be the result of general knowledge and teacher education (Tischler, 2007). This is how the ability of the teacher to take a responsible attitude towards the potential

personality of the student develops. The psychological erudition of the teacher enables the concretization of ethical action on the student in various phases and moments of educational action (Tischler, 2007).

The teacher fulfills the function of leading the cognitive process in teaching in several ways (Vasilev, 2007): he/she chooses suitable teaching contents; motivates students to discover and learn something new; encourages them to reach their goals and satisfy their curiosity; projects and plans in advance the general course of the learning process as a whole and in parts, keeping in mind the achievement of teaching goals; immediately organizes the cognitive process, trying to rationally use time, resources and energy; continuously takes care of improving, modernizing and innovating the cognitive process by applying modern methods, procedures and means. The special tasks of the teacher in the organization of the cognitive process in the lesson are to (Vasilev, 2007): direct the student's observations towards seeing the essential properties of observed objects, phenomena and processes and building clear ideas and concepts; help the development of the student's thinking activity and thought operations in order to understand the essence as deeply as possible and build a correct view of the world; develop in students the ability to independently plan the cognitive process, check hypotheses, conclude and apply known truths in new learning situations; equip the student for self-evaluation and a critical attitude towards other people's and their own conclusions.

The personality of the teacher as a creative factor in education should be built, and it is also the fruit of purposeful, long-term work on oneself. Pedagogical experience is gained gradually, as a result of observation and self-observation, analysis and generalization of one's own pedagogical experiences and tireless self-education (Horvat, Lapat, 2012). Comenius claims that the more persistently and precisely the soul observes its own activity, the greater and more beautiful tact will develop in a person. In that way, a teacher is created who is more complete, more correct and more harmonious (Comenius, 1954); a teacher who possesses intellectual virtue. *Virtue is something high, sublime and royal, invincible and tireless* (Seneca, 1944, 10). *Virtue is the most good of harmony with oneself. For virtues will have to be where there is harmony and complexity; and vices consist in separation from oneself* (Seneca, 1944, 13). In that way, strength and power are created in harmony with oneself and the reliable mind that does not contradict itself and does not waver in terms and beliefs. That way, there will be nothing left in the teacher that is distorted, suspicious, something that could cause him to stumble or waver.

There is no doubt that the first impulse towards the formation of a future teacher is given by the teacher's personality and inclination for this vocation. The teacher's authority and influence appear spontaneously. What emphasizes



the teacher's personality in the work is: the content and form of his/her lectures, persuasiveness and actualization that wins, scientific authority and artistic success, active participation in the spiritual and moral development of students, self-discipline and consistency, sovereign attitude in each situation (Gordon, 2008). All this indicates the rich inner life of the teacher's personality and human nobility. With his/her energy, the teacher conquers the students. Teaching can be the best game, but the teacher must be a serious player who knows what he/she is doing and keeps the focus on his/her goal.

### **HOW DID THE STUDENTS OF THE TECHNICAL SCHOOL “IVAN SARIĆ” SEE THE MATHEMATICS TEACHER?**

The teacher is the initiator and inspirer of democratic relations in the teaching process. He/she creates situations in which the independent and creative activity of students is maximally expressed. Freed from the task of being the main and only source of information, the teacher devotes a significantly larger part of his/her time to planning and carrying out educational tasks. Students are what makes teachers exist. According to the student's life and work-school needs, the personnel profile of the teacher should be provided. A mathematics teacher should present all the charms of mathematics and disarm all the bad myths and stories about this subject. The basic task of the mathematics teacher is to explain to the students that only those who are not afraid to open wide the doors of their intellectual possibilities can see how beautiful, interesting and addictive mathematics is (Krantz,1999).

During April of this school year, a survey was conducted among students of four-year courses at the Technical School “Ivan Sarić” in Subotica. As many as 154 students participated in the research – electrical engineering (66 students), mechanical engineering (34 students) and traffic (54 students). Questionnaires containing open-ended questions were distributed to students in mathematics classes. The students answered the questions anonymously. Students were asked open-ended questions:

1. What qualities do you value most in your math teacher (personal and work)?
2. What kind of people are suitable to perform the role of mathematics teacher?
3. What influences the creation of a positive or negative relationship between the mathematics teacher and the student?
4. What do students think about calling a math teacher in general?

In this way, students' reactions to certain personal and work characteristics of their mathematics teachers were studied, i.e. a certain image of a "math teacher in the eyes of students" was obtained. The goal of this research is to prepare a scientific argumentation for taking further measures to improve the personnel situation at the Technical School "Ivan Sarić" in Subotica. The students patiently, independently and willingly answered all the questions, so that all the given answers were taken into account during processing. The answers of all students were read, grouped by the number of questions and presented in the continuation of the paper.

The first question showed the characteristics through which the teacher expresses his/her respect for the student's personality. In the first place there is the understanding of students and their personal problems, followed by: pleasant and warm attitude towards students, clear, concise and interesting presentation of materials, cheerful mood and optimism, correct assessment, fairness and objectivity and finally image, appearance and manner of dressing.

According to students, in order to become a mathematics teacher, one must be educated and professional, must have innate talent, must be precise, meticulous and orderly, must be a humane and good person who respects and loves students and, in the end, should be a respected and respectable person. According to the students, it is the teachers' profession to educate the student's personality as a whole, with humanity and kindness, forming the basis of such an approach. Also, the students pointed out that in order to become a mathematics teacher, one must be full of love for oneself, others and one's subject; full of wisdom; a person who has an arranged and fulfilled life. Students are convinced that only a person who has an organized life filled with love and wisdom can participate in the lives of other people. The research showed that students believe that the mathematics teacher should be the person who will succeed in enabling them to collect and research information; interpret the types of problem tasks that need to be approached in different ways; assess whether they have enough facts and data needed to solve a problem; apply scientific methods; draw conclusions, analyze, use logic (induction and deduction); generalize, expand and modify the adopted positions; understand, interpret and judge ideas presented in written, oral or visual form; understand and use appropriate mathematical language; choose an adequate approach to a problem or task.

A mathematics teacher who is inaccessible, irresponsible, conceited and not self-critical, boring, distracted and forgetful, vindictive and angry, who is not interested in the material and students, contributes to the negative attitude towards students. The students pointed out that the teachers are most likely to offend the dignity of the students with a rough and raw way of expression. This most often

happens when students make a mistake. Students claim that teachers often get angry because of mistakes, and in such a state they use banal words, cursing and a whole vocabulary of distasteful and derogatory expressions. In this way, they hurt the moral personality, pride, honour and dignity of the students. The students believe that the teacher's speech should be harsh in tone, filled with ugly words, ridiculisation, underestimation, name-calling, scolding and cursing. A positive attitude towards students is contributed by a teacher who asks for feedback from students, who has enough understanding and patience, who answers students' questions and repeats parts of the material that are not clear to students, who regularly holds additional classes, who is eternally young, who works on himself/herself and follows current events in mathematics, who connects the material with real life. The students pointed out that the most important thing for achieving a positive relationship is trust. In an atmosphere of mutual trust, respect, loyalty and sincerity between teacher and student, noble and beneficial feelings germinate and grow. Students are aware that their opinion may be wrong, but that they should be listened to and corrected in a nice, tactful way. In this way, confidence and awareness of one's own value is encouraged.

The students pointed out that they are aware that mathematics develops thinking, helps us to have analytical thinking, accelerates the mind, creates practicality and can be applied on a daily basis. However, for most students, mathematics is abstract, complex and very difficult to understand. Because of the above, they are not interested in becoming mathematics teachers. According to students, there is only one way to progress in mathematics, as well as in other human activities, and that is science guided by love. Without science, love is powerless, and without love, science is destructive. Everything that was done to improve the mathematical education of students was done by those who believed in them and who loved them.

## CONCLUSION

Knowledge guided by love is what a teacher needs and what his/her students need to acquire. By creating good habits and good skills, the teacher influences the student's instincts to encourage the desired actions. There is no feeling of fear, restraint and resistance to temptations because the students have a feeling of unfettered spontaneity. Every teacher should teach students that they must translate their desires into persistent and disciplined work; that at all times they should be compassionate, just and good people who will prosper thanks to the purity of their hearts and that the love of truth must never die in them. In one generation, if

teachers decide to do so, they can create the kingdom of heaven on earth - health, freedom, happiness, goodness, intelligence. When students are free from fear and inhibition, rebellious or muted instincts, the world of knowledge will open to them freely and completely, without dark hidden corners. It is important that teachers awaken in students a spirit of adventure and freedom so that students feel they are walking the path of discovery. The path is clear. Teachers should ask themselves if they have enough love, respect and understanding to make students the way they can become - free, honest and sincere citizens of the universe?

Many students have misconceptions about the nature of mathematics and why they learn it. It is often heard from students: *Mathematics is difficult and abstract; I am afraid of mathematics; I will never need it; Mathematics is just a calculation; Mathematics is monotonous and boring ...* Such thoughts prevent students from mastering mathematics. A good math teacher serves to set things in place from the start. Research has shown that the mathematics teacher is the key person who helps students to love the subject, to get closer to the subject and to get rid of fear. Research has also shown that only those mathematics teachers who approach students gradually and with a lot of attention increase motivation and a positive attitude towards the subject. In this way, students gain confidence and faith in their ability to learn mathematics. A good mathematics teacher always starts from simple concepts, presents them in a very correct way with appropriate didactic material, uses the communication method that suits the student best and chooses an approach in which the student will feel the best. The above can be achieved only if the mathematics teacher approaches the student with a lot of understanding, empathy, attention, and patience, showing with his/her whole being the care towards student.

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## UČITELJ MATEMATIKE U OČIMA UČENIKA TEHNIČKE ŠKOLE “IVANA SARIĆA” SUBOTICA

### SAŽETAK

*Od 154 učenika koji su pohađali Tehničku školu “Ivan Sarić” u Subotici utvrđeno je mišljenje učenika o osobnim i radnim karakteristikama njihovih nastavnika matematike. Učenicima su postavljena četiri pitanja otvorenoga tipa na koja su davali iskrene odgovore. Istraživanje je pokazalo da učenici od učitelja očekuju veću uključenost u praćenje njihovih razvojnih i osobnih problema koji su posebno značajni u adolescentskome razdoblju; više cijene one nastavnike koji im omogućuju veću aktivnost, neposredniji kontakt s izvorima znanja, više razgovora, rasprave i razmjene ideja, veću osobnu slobodu postavljanja pitanja i više prava na sudjelovanje u nastavi i izražavanje svojih ideja, mašte i kreativnosti.*

**Ključne riječi:** odgoj i obrazovanje, učitelj, učitelj matematike, učenik, osobnost učitelja.